distinct and natural to be taken for any impression other than photographic. What these rivers, if we may use such a term, are composed of is at present a subject of mere conjecture, but the day is not far off when a very careful systematic study will have to be undertaken to settle some of the questions that have been recently raised in respect to our satellite's surface.

Comet Swift (1892 March 6).—The ephemeris of this comet for the ensuing week, taken from the *Edinburgh Circular*, No. 28, is as follows:—

Berlin Midnight.

1892.	R.A. h. m. s.	Decl. ° ′	log Δ.	log *r*.	Br.
July 14	0 58 26	+49 20·8			
15	59 6	49 31·4			
16	0 59 44	49 41·8	0·2459	0·2776	0·15
17	1 0 19	49 51·9			
18	0 52	50 1·8			
19	1 22	50 11·5			
20	1 49	50 21·0	0·2488	0·2884	0·14

Brightness at time of discovery taken as unity. The comet lies in the southern extremity of the constellation of Cassiopeia.

Opposition of Mars.—All observatories which have the necessary equipment are especially invited by the United States Naval Observatory to join with them in making observations of the coming opposition of Mars. Observations should commence on June 20 to September 23, this period being divided into three parts, the comparison stars for the first section being O.A.S. 20970, η Capricorni, 27 Capricorni, φ Capricorni, Lacaille 8851, 41 Capricorni, D.M. – 20°, 6923, Lalande 42700. It may be mentioned that observations made in accordance with the special circular which the U.S. Observatory has issued will be reduced by them.

Sun-Spots.—*Himmel und Erde* for July contains two very good photographs of the sun at the time of the great spot in the month of February. They were photographed by Dr. Lohse, at the Astrophysical Observatory at Potsdam. One was taken on February 13 at 10h., and shows the large group near central transit with a smaller group on the limb; while in the other, the large group is nearer the western limb. A small disc represents the relative size of the earth for comparison.

Remarkable Prominences.—The sun's atmosphere this year has been subject to many violent disturbances, indicated to us by the presence of spots, prominences, &c. The spots, with special reference to the February group, have already received much attention, but not so with the prominences. From a set of forty observations of the latter made between March 1 and May 31, 1892, by M. Trouvelot, 23 of these, as he says, belonged to the most interesting type, *i.e.*, eruptive. On April 6, 1892, there appeared an arched like prominence on the sun's limb, extending through 12°, the length of its base being 144,932 and its height 92,664 kilometres; to give an idea of the size of this arch, it may be stated that as many as 22 globes the size of our earth might have simultaneously passed under it. At 10h. 54m., on the 8th of the same month, a huge column of light, in shape rather like a candle flame, rose to a height of 115,830, extending, in a little over half-an-hour, to 169,884 kilometres. A prominence of far greater length, occupying 34° of the solar limb, but of much less height than those mentioned above, was visible on April 15. Its base covered 410,632 kilometres, thus exceeding ten times the circumference of our earth.

GEOGRAPHICAL NOTES.

At the last meeting of the Council of the Royal Geographical Society for the present session, it was unanimously agreed to admit women as Fellows on the same terms as men. There is nothing in the society's charter to limit the membership to men, and the proposal of admitting ladies has been made several times, and on the last occasion—two years ago—was nearly carried. As there will not be another meeting of the society until the opening of next session, the election of the first lady F.R.G.S. cannot take place until November.

The Annual Congress of the French Geographical Societies meets this year at Lille in the first week of August, for the consideration of questions relating mainly to France and its colonies. The French Association for the Advancement of Science will hold its meeting at Pau, as we have already announced, in the third week of September. Its Geographical Section will be presided over by M. E. Anthoine, head of the French Map Department and of Graphic Statistics under the Minister of the Interior. In all departments of geography there is a remarkable revival of interest among Frenchmen at the present time, although the narrow or national aspect of the subject predominates over the wider or cosmopolitan.

A curious account of the piratical Tugere tribe of New Guinea has been published in most of the continental geographical journals on the authority of "an English medical missionary, Dr. Montague," who was picked up by a Dutch war-vessel near the boundary of Dutch and British New Guinea. This gentleman told a remarkable narrative of his capture and imprisonment by the Tugere, but as no English missionary of his name is known to be in New Guinea, nor has any mission station been recently raided by the Tugere, there is no doubt that some mistake has been made. It is impossible that so serious an incident as the imprisonment of an English missionary could be unknown in this country, and unless strong evidence were forthcoming, it is difficult to believe that such a thoroughly piratical people as the Tugere could show the diligence in agriculture and the relatively high civilization with which the story credits them.

M. E. A. Martel continues his researches into the subterranean geography of France. In March last he descended the "unfathomable" Creux-Percé on the plateau of Langres, proving it to be only 180 feet deep. It is a hollow in Jurassic limestone, and, although open to daylight, forms a natural ice-house, having a temperature of 28°F. when the external air was at 58°. In June he examined the still more remarkable Creux de Souci in the department of the Puy de Dôme. It proved to be a rounded cavity in recent basalt, 115 feet deep, having the appearance of being formed by a great gas bubble. A stagnant pool occupied the bottom of the pit, and above it the air was so much impregnated with carbonic acid that a candle would not burn. In this instance also the temperature fell as the distance from the surface increased, that of the external air being 51°, of the air at the bottom of the shaft 34°, and the water itself 34°·3. The Paris Society of Commercial Geography recently awarded a medal to M. Martel on account of the practical value of his researches in leading to the regulation of the underground drainage of Greece.

EASTER ISLAND.

The prehistoric remains of Easter Island make it for archæologists one of the most interesting islands in the Pacific. They will therefore read with interest an elaborate paper in the Report of the U.S. National Museum for 1888–89, which has just been issued. The paper is entitled "Te Pito Te Henua, or Easter Island," and is by William J. Thomson, Paymaster, U.S. Navy. It records the results of researches made by Mr. Thomson during a visit paid to Easter Island by the American vessel, the *Mohican*, towards the end of 1886. The *Mohican* anchored in the Bay of Hanga Roa on the morning of December 18, 1886, and remained till the evening of the last day of the year, when she sailed for Valparaiso. Mr. Thomson and some of his comrades, interested in the relics of a past phase of life in the island, made the most of the short time at their disposal, and his essay will certainly rank among the most important contributions which have been made to our knowledge of the subject with which it deals.

He begins with a general account of Easter Island, and in this part of his work has succeeded in presenting compactly and clearly much valuable information. Of the geological features of the island he says that they are "replete with interest." The formation is purely volcanic, and embraces every variety pertaining to that structure. The tufaceous lavas form the most prominent element in the physiognomy of the island. To them, with the action of the trade-winds and heavy rains, is due the fact that Easter Island is surrounded by precipitous cliffs, rising in some cases to a thousand feet in height. The formation is extremely friable, and by the action of the elements enormous masses are continually disappearing beneath the waves that beat on the unprotected shore. Both on the coast-line and in the interior there are many natural caves. Some of these are of undoubted antiquity, and bear evidence of having been used by early inhabitants as dwellings and burial-places. It is reported that small images, inscribed tablets, and other objects of interest have been hidden away in such caves and lost through land-slides.

The climate is not unlike that of Madeira, with one wet and one dry season. Yams, potatoes, and taro are cultivated, the young plants being protected from the fierce heat of the sun by a mulching of dried grass gathered from the uncultivated ground. Bananas are grown, and so is sugar-cane, but the natives do not extract the juice for the purpose of making sugar. A wild gourd is common, and constituted the only water-jar and domestic utensil known to the islanders. Mr. Thomson saw no flowering plants indigenous to the soil, but ferns of many varieties are common, and grow in profusion in the craters of the volcanoes. Except in a few exposed places, the slopes of the hills and the valleys are covered with a perennial grass resembling the Jamaica grass (*Paspalum*). This natural growth supplies ample pasturage for cattle and sheep.

The only quadrupeds peculiar to the island are several varieties of rodents. Fish abounds in the surrounding sea, and has always been the principal means of support for the islanders. Turtles are also plentiful, and are highly esteemed. The turtle occupies a prominent place in tradition, and is frequently represented in the hieroglyphics. It appears also on sculptured rocks.

According to the traditions of the natives, the island was discovered by King Hotu-Matua, who came from the land in the direction of the rising sun, with two large double canoes and three hundred chosen followers. Mr. Thomson thinks there may have been more than one migration of people to the island, and that their traditions may have been mingled together; but there can, he believes, be no reasonable doubt about the progenitors of the present islanders being of the Malayo-Polynesian stock. The people were shockingly treated by some of the early voyagers, and in 1863 the majority of the able-bodied men were kidnapped by Peruvians, who carried them away to work in the guano deposits of the Chincha Islands and the plantations in Peru. Just before the arrival of the *Mohican* a complete census of the population had been taken by Mr. Salmon, who found that the total number of natives was 155. The children are not much darker than Europeans, but the skin assumes a brown hue as they grow up and are exposed to the sun and trade-winds. The eyes are dark brown, bright, and full, with black brows and lashes not very heavy. The countenance is usually open, modest, and pleasing. In disposition the natives are cheerful and contented. They all profess Christianity, but there are now no missionaries among them, and they display a tendency to return to the old Pagan ideas. Tattooing is no longer practised, but every islander advanced in life is ornamented in all parts of the body.

At one time the island must have been densely populated, and the surviving monuments show that the inhabitants had attained to a higher civilization than that of other Polynesians. The ancient stone houses at Orongo were thoroughly explored by Mr. Thomson and his party. These curious dwellings seem to have been built for the accommodation of the natives while the festival of the "sea-birds' eggs" was being celebrated. During the winter months the island is visited by great numbers of sea-birds, most of which build their nests among the ledges and cliffs of the inaccessible rocks. Some, however, choose two islets lying a few hundred yards from the south-west point of Easter Island, and the natives are believed to have selected Orongo as a convenient spot for watching for the coming of the birds. The fortunate person who obtained possession of the first egg, and returned with it unbroken to the expectant crowd, became entitled to certain privileges and rights during the following year. Near Orongo are the most important sculptured rocks in the island. They are covered with carvings intended to represent human faces, birds, fishes, and mythical animals, all very much defaced by the time and the elements. The most common figure is a mythical animal, half human in form, with bowed back and long claw-like legs and arms. According to the natives, this symbol represented "Meke-Meke," the great Spirit of the sea.

On the high bluff west of Kotatake Mountain the party discovered the ruins of a settlement extending more than a mile along the coast-line and inland to the base of the hill. These remains bear unmistakable evidences of being the oldest habitations on the island. The houses are elliptical in shape, with doorways facing the sea, and were built of uncut stone. Some of the walls are standing, but the majority are scattered about in confusion. Each dwelling was provided with a small cave or niche at the rear end, built of loose lava stones, which was in a number of instances covered by an arch supported by a fairly shaped key-stone. The recesses were "undoubtedly designed to contain the household gods."

Mr. Thomson has, of course, much to say about the stone images with the idea of which Easter Island is intimately associated in the minds of all who have devoted any attention to its antiquities. Every image in the island was counted, and the list shows a total of 555 images. Mr. Thomson says:—

"Of this number forty are standing inside of the crater, and nearly as many more on the outside of Rana Roraka, at the foot of the slope where they were placed as finished and ready for removal to the different platforms for which they were designed; some finished statues lie scattered over the plains as though they were being dragged toward a particular locality but were suddenly abandoned. The large majority of the images, however, are lying near platforms all around the coast, all more or less mutilated, and some reduced to a mere shapeless fragment. Not one stands in its original position upon a platform. The largest image is in one of the workshops in an unfinished state, and measures 70 feet in length; the smallest was found in one of the caves, and is a little short of three feet in length. One of the largest images that has been in position lies near the platform which it ornamented, near Ovahe; it is 32 feet long, and weighs 50 tons.

"Images representing females were found. One at Anakena is called 'Viri-viri Moai-a-Taka,' and is apparently as perfect as the day it was finished; another, on the plain west of Rana Roraka is called 'Moai Putu,' and is in a fair state of preservation. The natives have names for every one of the images. The designation of images and platforms as obtained from the guides during the exploration was afterwards checked off in company with other individuals without confusion in the record. The course gray trachytic lava of which the images were made is found only in the vicinity of Rana Roraka, and was selected because the conglomerate character of the material made it easily worked with the rude stone implements that constituted the only tools possessed by the natives. The disintegration of the material when exposed to the action of the elements is about equivalent to that of sandstone under similar conditions, and admits of an estimate in regard to the probable age. The traditions in regard to the images are numerous, but relate principally to impossible occurrences, such as being endowed with power to walk about in the darkness, assisting certain clans by subtle means in contests, and delivering oracular judgments. The legends state that a son of King Mahuta Ariiki, named Tro Kaiho, designed the first image, but it is difficult to arrive at an estimation of the period. The journals of the early navigators throw but little light upon the subject. The workshops must have been in operation at the time of Captain Cook's visit, but unfortunately his exploration of the island was not directed towards the crater of Rana Roraka.

"Although the images range in size from the colossus of 70 feet down to the pigmy of 3 feet, they are clearly all of the same type and general characteristics. The head is long, the eyes close under the heavy brows, the nose long, low-bridged, and expanded at the nostrils, the upper lip short and the lips pouting. The aspect is slightly upwards, and the expression is firm and profoundly solemn. Careful investigation failed to detect the slightest evidence that the sockets had ever been fitted with artificial eyes, made of bone and obsidian, such as are placed in the wooden images.

"The head was in all cases cut flat on top, to accommodate the red tufa crowns with which they were ornamented, but the images standing outside of the crater had flatter heads and bodies than those found around the coast. The images represent the human body only from the head to the hips, where it is cut squarely off to afford a good polygon of support when standing. The artists seem to have exhausted their talents in executing the features, very little work being done below the shoulders, and the arms being merely cut in low relief. The ears are only rectangular projections, but the lobes are represented longer in the older statues than in those of more recent date.

"The images were designed as effigies of distinguished persons, and intended as monuments to perpetuate their memory. They were never regarded as idols, and were not venerated or worshipped in any manner. The natives had their tutelary genii, gods, and goddesses, but they were represented by small wooden or stone idols, which bore no relation to the images that ornamented the burial platforms. The image-makers were a privileged class, and the profession descended from father to son.

Some of the natives still claim a descent from the image-makers, and refer to their ancestors with as much pride as to the royal family.

"The work of carving the image into shape, and detaching it from the rock of which it was a part, did not consume a great deal of time, but the chief difficulty was, in the absence of mechanical contrivances, to launch it safely down the slope of the mountain and transport it to a distant point. It was lowered to the plain by a system of chocks and wedges, and the rest was a dead drag accomplished by main strength. A roadway was constructed, over which the images were dragged by means of ropes made of indigenous hemp, and sea-weed and grass made excellent lubricants. The platforms were all built with sloping terraces in the rear, and up this incline a temporary road-way was constructed of a suitable height, upon which the statue could be rolled until the base was over its proper resting-place. The earth was then dug away to allow the image to settle down into position, the ropes being used to steady it in the meantime."

Interesting as these monuments are, they are less remarkable than the incised tablets which show that the Easter Islanders had worked out for themselves a kind of writing. The following account of the tablets is given by Mr. Thomson. Their existence "was not known until the missionaries settled upon the island, Numerous specimens were found in the possession of the natives. but no especial attention appears to have been directed towards them. Several persons, belonging to vessels that were wrecked at Easter Island, report having seen such tablets, but the natives could not be induced to part with them. The three hundred islanders who emigrated to Tahiti had in their possession a number of tablets; they created some attention on account of the remarkable skill with which the figures were executed, but they were highly prized by the owners, and no effort was made to secure them because their real value was not discovered. The Chilian corvette *O'Higgins* visited Easter Island in January 1870, and Captain Gana secured three tablets, two of which are on deposit in the National Museum at Santiago de Chili, and the third was sent to France, but does not appear to have reached its destination. Paper impressions and casts were taken from the Chilian tablets for the various Museums of Europe. Those sent to the English Ethnological Society created some interest after a time, but others sent to Berlin were regarded as stamps for marking native cloth (*Mittheilungen*, July 1871). Seven of these tablets are now in the possession of Tepano Jansser, Bishop of Axieri, all in excellent state of preservation.

"While the *Mohican* was at Tahiti, the Bishop kindly permitted us to examine these tablets and take photographs of them. These tablets were obtained from the missionaries who had been stationed on Easter Island, and they ranged in size from 5½ inches in length by 4 inches broad, to 5½ feet in length and 7 inches wide. Diligent search was made for specimens of these tablets during our visit to Easter Island. At first the natives denied having any, but Mr. Salmon knew of the existence of two, and these were finally purchased after a great deal of trouble and at considerable expense. The tablets obtained are in a fair state of preservation. The large one is a piece of drift-wood that from its peculiar shape is supposed to have been used as a portion of a canoe. The other is made of the toromiro wood indigenous to the island. In explanation of the disappearance of these tablets, the natives stated that the missionaries had ordered all that could be found to be burned, with a view to destroying the ancient records, and getting rid of everything that would have a tendency to attach them to their heathenism, and prevent their thorough conversion to Christianity. The loss to the science of philology by this destruction of valuable relics is too great to be estimated. The native traditions in regard to the incised tablets simply assert that Hotu-Matua, the first king, possessed the knowledge of this written language, and brought with him to the island sixty-seven tablets containing allegories, traditions, genealogical tables, and proverbs relating to the land from which he had migrated. A knowledge of the written characters was confined to the royal family, the chiefs of the six districts into which the island was divided, sons of those chiefs, and certain priests or teachers, but the people were assembled at Anekena Bay once each year to hear all of the tablets read. The feast of the tablets was regarded as their most important *fête* day, and not even war was allowed to interfere with it.

"The combination of circumstances that caused the sudden arrest of image-making, and resulted in the abandonment of all such work on the island, never to be again revived, may have had its effect upon the art of writing. The tablets that have been found in the best stage of preservation would correspond very nearly with the age of the unfinished images in the workshops. The ability to read the characters may have continued until 1864, when the Peruvian slavers captured a large number of the inhabitants, and among those kidnapped were all of the officials and persons in authority. After this outrage, the traditions, &c., embraced by the tablets, seem to have been repeated on particular occasions, but the value of the characters was not understood, and was lost to the natives.

"A casual glance at the Easter Island tablets is sufficient to note the fact that they differ materially from other kyriologic writings. The pictorial symbols are engraved in regular lines on depressed channels, separated by slight ridges intended to protect the hieroglyphics from injury by rubbing. In some cases the characters are smaller, and the tablets contain a greater number of lines, but in all cases the hieroglyphics are incised, and cover both sides as well as the bevelled edges and hollows of the board upon which they are engraved. The symbols on each line are alternately reversed; those on the first stand upright, and those on the next line are upside down, and so on by regular alternation.

"This unique plan makes it necessary for the reader to turn the tablet and change its position at the end of every line; by this means the characters will be found to follow in regular procession. The reading should commence at the lower left-hand corner, on the particular side that will bring the figures erect, and followed as the characters face in the procession, turning the tablet at the end of each line, as indicated. Arriving at the top of the first face, the reading is continued over the edge to the nearest line, at the top of the other side, and the descent continues in the same manner until the end is reached. The Boustrophedon method is supposed to have been adopted in order to avoid the possibility of missing a line of hieroglyphics."

A man called Ure Vaeiko, one of the patriarchs of the island, professed to have been under instructions in the art of hieroglyphic reading at the time of the Peruvian visit, and claimed to understand most of the characters. The photographs of the tablets owned by the Bishop were submitted to this old man, who related with fluency and without hesitation the legend which he declared to be appropriate to each. "The story of all the tablets of which we had knowledge," says Mr. Thomson, "was finally obtained, the words of the native being written down by Mr. Salmon as they were uttered, and afterwards translated into English."

Ure Vaeiko's tales, with the translations, are printed in Mr. Thomson's paper; and, as they are manifestly not the reciter's own invention, they have a certain interest for students of anthropology. But whether they represent the meaning of the inscriptions on the mysterious tablets is another question. It is noteworthy that, although Ure Vaeiko's fluent interpretation of the tablets was not interrupted, "it became evident that he was not actually reading the characters." "It was noticed that the shifting of the position did not accord with the number of the symbols on the lines, and afterwards, when the photograph of another tablet was substituted, the same story was continued without the change being discovered." These facts raise a doubt as to the trustworthiness of his pretensions to knowledge. However, Mr. Thomson does not seem to have yet presented a full account of the work accomplished in connection with this curious problem. "Results of an extremely interesting nature," he says, "are barely outlined at present, and not in shape to be presented herewith. It is not considered expedient to attempt an explanation of the symbols until the subject can be treated exhaustively."

It remains for us only to say that the paper is richly illustrated, and accompanied by a map of Easter Island.

EMBRYOGENY OF GNETUM.

THE remarkable observations of Treub on the mode of fertilization in the *Casuarinaceæ*,[1] have been followed by some almost equally interesting, by Herr Karsten, on the formation of the embryo in *Gnetum*. The following is a summary of the more important points, as described in the *Botanische Zeitung*.

The inner integument of the ovule develops into a long tube leading to the apex of the nucellus, and projecting far beyond

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[1] See NATURE, vol. xlv. p. 548.